



**MINERALS COUNCIL OF AUSTRALIA**  
**ENVIRONMENT AND OTHER LEGISLATION AMENDMENT**  
**(REMOVING NUCLEAR ENERGY PROHIBITIONS) BILL 2022**

**SUBMISSION**

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## 1. EXECUTIVE SUMMARY

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Australia has a unique opportunity to deliver a net-zero emissions future with nuclear power included as part of a diverse energy mix. With a skilled workforce, abundant natural resources and a comprehensive legislative framework, Australia is ready to meet its national and global energy security and emissions reduction goals.

The MCA supports the aims of the *Environment and Other Legislation Amendment (Removing Nuclear Energy Prohibitions) Bill 2022* introduced on 28 September 2022 by Senator the Hon Matt Canavan.

Australia, as a mature and stable western democracy has a unique opportunity to prepare for a net-zero emissions future.

The International Atomic Energy Agency and the International Energy Agency recognise the role for nuclear energy in a decarbonised world. As such, Australia should be technology agnostic in its aim to achieve net-zero emissions by 2050.

As Australia looks to decarbonise its energy networks, small modular reactors (SMRs) offer advantages as they provide constant and variable energy to support grid resilience and can be deployed near existing transmission infrastructure. It is anachronistic to retain a prohibition on this suite of zero carbon energy technologies in an era requiring carbon dioxide emissions reduction.

Low emission SMRs enable the redeployment of existing energy generation skills and capabilities, provide high-value employment and support the economic viability of regional communities; all near valuable and expensive existing transmission infrastructure.

Importantly, the MCA notes that the intent of the Bill should form part of a suite of reforms in Australia regarding nuclear technologies including:

- Removing state bans and restrictions on uranium mining and nuclear energy
- Removing uranium mining from the nuclear actions trigger of the *Environmental Protection and Biodiversity Conservation Act (1999)*.

## 2. INTRODUCTION

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The Australian minerals industry recognises the need for a measured and orderly transition to a low emissions economy through policy settings that are calibrated with global action, use market mechanisms for cost-effective mitigation, and focussed upon technological development.

The MCA and its members have a strong commitment to climate action through support of the Paris Agreement and an industry ambition of net zero by 2050. As a major exporter, Australia's uranium has a leading role in a nuclear industry that avoids 1.5 gigatonnes of global emissions and 180 billion cubic metres of global gas demand a year.<sup>1</sup>

A domestic nuclear energy industry could play a significant role in Australia's efforts to decarbonise by leveraging existing expertise in the nuclear fuel cycle and using the technology to ensure energy reliability and bolster national security.

Australia has:

- The world's largest Economic Demonstrated Resources of uranium and is the world's fourth largest uranium producer<sup>2</sup>
- Outside of the proposed amendments, a comprehensive legislative framework to manage potential impacts from development of a domestic nuclear energy industry (see Section 4)
- Joined international parties in various safeguards agreements, treaties and other commitments to the peaceful use of nuclear technology
- More than 60 years' experience in safe operation of a nuclear research reactors
- A commitment to acquire nuclear-powered submarines
- A standalone government agency to manage radioactive waste
- An independent agency tasked with regulation of nuclear activities.

This shows how nuclear technology can play an important role to play in Australia's energy transition. Not only can emerging nuclear technologies replace older fossil-fuel generation as it exits the system, there is potential for micro-modular reactors (MMRs) and small modular reactors (SMRs) to power remote mine sites, water desalination plants and hydrogen production (see Section 3).

The amendments proposed by this Bill remove the final regulatory impediments to nuclear power that were established over 40 years ago. These concerns are no longer relevant and are a hindrance to the optimal reduction of greenhouse gas emissions. Rather, Australia should embrace emerging nuclear technologies as an option to:

1. Meet its international environmental commitments through an established and comprehensive legislative framework and
2. Ensure it has available all potentially useful technologies at its disposal to incorporate into its low emissions future energy infrastructure.

A program of work for building community support for nuclear energy should begin as soon as possible. Passing the proposed legislation would signal to investors that such options can be considered.

The reforms proposed by the Bill allow this important work to commence.

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<sup>1</sup> International Energy Agency, [Fuel and Technologies – Nuclear](#), viewed 15 December 2022

<sup>2</sup> World Nuclear Association, [Australian Uranium](#), viewed 15 December 2022

### 3. SMR TECHNOLOGY FOR LOW-EMISSION ENERGY GENERATION

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#### International view of SMRs

According to the International Atomic Energy Agency (IAEA), there are more than 70 commercial designs for nuclear SMRs under development.<sup>3</sup>

Not all of these designs will make it to market, however the scale of investment indicates the viability of the technology for a smaller number of successful manufacturers.

A World Nuclear Association (WNA) report said that the enormous potential of SMRs rests on a number of factors:

- Because of their small size and modularity, SMRs could almost be completely built in a controlled factory setting and installed module by module, improving the level of construction quality and efficiency
- Their small size and passive safety features make them suitable to countries with smaller grids and less experience of nuclear power
- Size, construction efficiency and passive safety systems (requiring less redundancy) can lead to easier financing compared to that for larger plants
- Moreover, achieving 'economies of series production' for a specific SMR design will reduce costs further.<sup>4</sup>

The WNA report also lists the specific features of an SMR, including:

- Small power and compact architecture and usually (at least for nuclear steam supply system and associated safety systems) employment of passive concepts. Therefore there is less reliance on active safety systems and additional pumps, as well as alternating current (the standard distribution type) power for accident mitigation
- The compact architecture enables modularity of fabrication (in-factory), which can also facilitate implementation of higher quality standards
- Needing lower power leading to reduction of the source term as well as smaller radioactive inventory in a reactor (smaller reactors)
- The potential for sub-grade (underground or underwater) location of the reactor unit providing more protection from natural (e.g. seismic or tsunami according to the location) or man-made (e.g. aircraft impact) hazards
- The modular design and small size lends itself to having multiple units on the same site.
- A lower requirement for access to cooling water – therefore suitable for remote regions and for specific applications such as mining or desalination
- The ability to remove reactor module or in-situ decommissioning at the end of the lifetime.

This technology has potentially high applicability in the Australian energy network given its scalability and repeatability. As noted by the IAEA, 'repurposing fossil plants with SMRs, besides helping lower emissions and maintain energy security, could also ensure a just economic transition for local communities'.<sup>5</sup>

The International Energy Agency is clear on the role for nuclear energy in a decarbonised world:

While wind and solar PV are expected to lead the push to replace fossil fuels, they need to be complemented by dispatchable resources. As today's second largest source of low emissions power after hydropower, and with its dispatchability and growth potential, nuclear – in countries where it is accepted – can help ensure secure, diverse low emissions electricity systems.<sup>6</sup>

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<sup>3</sup> International Atomic Energy Agency, [What are Small Modular Reactors \(SMRs\)?](#), viewed 15 December 2022

<sup>4</sup> World Nuclear Association, [Facilitating International Licensing of Small Modular Reactors, Cooperation in Reactor Design Evaluation and Licensing \(CORDEL\) Working Group](#), August 2015

<sup>5</sup> International Atomic Energy Agency, [Repurposing Fossil Fuel Power Plant Sites with SMRs](#), June 2022

<sup>6</sup> International Energy Agency, [Fuel and Technologies – Nuclear](#), viewed 15 December 2022

## **Nuclear for Australia's energy security and national security**

On 16 September 2021 the Australian Government announced a new trilateral security partnership with the United Kingdom and the United States (AUKUS), containing a commitment to purchase nuclear-powered submarines for the Australian Navy.<sup>7</sup>

The technology will be supplied by UK or US manufacturers, however both options are similar in concept. In the example of the US Virginia Class submarine a small nuclear reactor, shielded from the crew, supplies propulsion and on-board electricity enabling near-silent operation and extended periods submerged.<sup>8</sup> This S9G reactor is designed to last for the operating life of the submarine and provide a constant 29.84 MW of power.

While this micro-modular reactor (MMR) is designed for a specific application and is smaller than proposed SMRs, it certainly is a reliable and proven concept.

It is also reasonable to suggest that future MMRs could be suited to remote mine sites for energy generation and water desalination. Concept designs for mobile MMRs could supply energy for fixed periods of time at various remote locations<sup>9</sup> – allowing the unit to be moved to another location with relative ease.

The possibility of designing a reactor to deliver 300 MW – a mid-range option between naval propulsion and traditionally large ~1000 MW nuclear power plants – should be considered as reasonably achievable within the next decade.

The MCA's publication *Small Modular Reactors in the Australian Context* authored by Dr Ben Heard in 2022, notes the following:

Now that Australia has committed to building nuclear-powered submarines, Australia will need to develop the skills and expertise to support the new fleet. This capacity could also support the deployment of SMRs.

The new SMR designs are being commercialised to provide low cost 24/7 zero emission heat and power. With smaller size, lower unit costs and passive and inherent safety features, SMRs have the potential to deploy more quickly in a broader range of markets.

From replacing aging power plants in mature, slow-growing and (commonly) liberalised power markets; to developing nations with lesser underlying transmission infrastructure; to reliable clean power for remote, off-grid locations, SMRs can potentially underpin zero emission power supplies in many settings.<sup>10</sup>

Energy security supports economic activity – particularly with regard to the Government's policy for increased manufacturing through the National Reconstruction Fund – but is dependent on constant and reliable supply.<sup>11</sup>

In October 2021, following the AUKUS announcement, the Australian Workers Union (AWU) confirmed its support for this nuclear.<sup>12</sup> AWU National Secretary, Dan Walton, observed that, to support modern manufacturing, 'you could easily envision SMRs attached to factories, steel mills, and aluminium smelters. They would provide the kind of reliable, constant energy these facilities need to survive and thrive'.

## **Workforce challenges and opportunities**

The benefits for manufacturing and its associated workforce is just the beginning of what a domestic nuclear energy industry based on SMR technology could bring Australia.

One of the challenges of replacing coal and gas-fired energy generation with large-scale wind and solar is the dispersed nature of this new infrastructure.

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<sup>7</sup> Australian Government, [Joint media statement: Australia to pursue nuclear-powered submarines through new trilateral enhanced security partnership](#), September 2021

<sup>8</sup> Naval Technology, [NSSN Virginia-Class Attack Submarine](#), August 2020

<sup>9</sup> Nikkei Asia, [Mitsubishi Heavy aims to build 'reactor-on-a-truck' by 2030s](#), viewed 15 December 2022

<sup>10</sup> Ben Heard, [Small modular reactors in the Australian context 2<sup>nd</sup> edition](#), Minerals Council of Australia, December 2022

<sup>11</sup> Australian Labor Party, [National Reconstruction Fund](#), viewed 15 December 2022

<sup>12</sup> Australian Worker's Union, [It's Time: Nuclear](#), 13 October 2021

Over the next 25 years, communities across Australia will face workforce challenges as existing coal-fired generation exits the market. However, the proposed changes to the two Acts could facilitate transition to local roles within a replacement nuclear energy project.

While current government policy prevents the Australian Energy Market Operator (AEMO) looking at nuclear as a potential solution, the US situation is starkly different.

In September 2022, in the report *Investigating Benefits and Challenges of Converting Retiring Coal Plants into Nuclear Plants*, the United States Department of Energy identified that 'hundreds of coal power plant sites across the country could be converted to nuclear power plant sites' that would 'dramatically increase the supply of firm and dispatchable clean electricity to the grid and deliver huge gains to the nation's goal of net-zero emissions by 2050'.<sup>13</sup>

The report notes that by replacing coal-fired capacity with nuclear, 'jobs in the region could increase by more than 650 permanent jobs for the NuScale (SMR) design example in the case study'.<sup>14</sup>

Given the structure of Australia's east-coast energy market, there is similar opportunity to transition communities and existing workforces supporting fossil fuel generation across to a low-emission technology with a long lifespan. An early sign of such potential community interest is the changed view of the energy and mining union in the Latrobe Valley seeking to remove the prohibitions on nuclear power for this very reason.<sup>15</sup>

Addressing the Submarine Institute of Australia Conference in late-2022, Vice Chancellor of the Australian National University, Professor Brian Schmidt AC, noted that, 'bringing a fleet of (nuclear submarines) into service will be one of the biggest training and workforce development challenges Australia has faced'.<sup>16</sup>

Embracing nuclear energy in Australia may also help to develop the workforce necessary to maintain and operate nuclear-powered submarines in the 2040s, further enhancing Australia's energy security and national security.

### **Creating options for net-zero energy generation**

The MCA supports the transition to net-zero emissions by 2050.

The step-change scenario in AEMO's 2022 Integrated System Plan (ISP), with renewables generating 83 per cent of National Energy Market (NEM) energy by 2030-31, places large emphasis on the availability of batteries to store and dispatch excess renewable energy.

To support Australia's commitment to the Paris Climate Agreement, the government should include nuclear energy as a low-emissions option to support renewables in the medium term.

### **Australia's approach to the nuclear fuel cycle**

For much of the last five decades there has been an abundance of cheap and available fossil fuel and a lack of urgency regarding decarbonisation. However, in 2022 there is a need to continue growing public support and amend legislation to facilitate the possible use of nuclear technologies to meet Australia's commitments under the Paris Climate Agreement.

South Australian Premier, the Hon Peter Malinauskas MP, argues that 'nuclear power does have a role to play because the simple fact is it's a baseload source of energy that is decarbonised ... so it should be a technology that's on the table globally in our effort to decarbonise'.<sup>17</sup>

<sup>13</sup> United States Government, [Could the Nation's Coal Plant Sites Help Drive a Clean Energy Transition?](#), Department of Energy, September 2022

<sup>14</sup> NuScale, [NuScale SMR Technology: An Ideal Solution for Repurposing U.S. Coal Plant Infrastructure and Revitalizing Communities](#), 2021. Viewed 15 December 2022

<sup>15</sup> G Dyke, [Submission to Victorian Parliament's Environment and Planning Committee Inquiry into Nuclear Prohibition in Victoria](#), CFMMEU – Mining and Energy Division, January 2020

<sup>16</sup> Professor Brian Schmidt AC, [Building Australia's AUKUS-ready nuclear workforce](#), 9 November 2022

<sup>17</sup> Sky News Australia, ['Nuclear' energy is not economically viable for South Australia](#), 15 November 2022

There is clear opportunity for a domestic nuclear industry based on existing experience and resources. South Australia has demonstrated support for the nuclear fuel cycle, and holds relevant mineral reserves, networks and regulatory authorities to advance a nuclear energy industry.

Through bi-partisan government support for uranium mining, South Australia is home to considerable expertise in the development of uranium mines and associated supply chains, as well as the National Radioactive Waste Management Facility and the Australian Radioactive Waste Agency.

Between 2000 and 2020, South Australia produced and exported over A\$6.7 billion of uranium oxide across the state. During that time, mineral exploration companies spent A\$470 million exploring for uranium in the state.

It is notable that the jurisdiction in Australia most advanced in progressing renewable energy developing sees a potential role for nuclear to complement renewable energy rather than substitute for it. As such, South Australia is a prime example of how the nuclear prohibition constrains Australia's net-zero options.

The Nuclear Fuel Cycle Royal Commission in 2016 recommended an end to the ban on nuclear power and specifically recommended that the 'South Australian Government pursue removal at the federal level of existing prohibitions on nuclear power generation to allow it to contribute to a low-carbon electricity system, if required.'<sup>18</sup>

The Commission also noted that 'there will be in coming decades a need to significantly reduce carbon emissions and as a result to decarbonise Australia's electricity sector' and that 'nuclear power, as a low-carbon energy source comparable with other renewable technologies, may be required as part of a lower-carbon electricity system'.

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<sup>18</sup> [Nuclear Fuel Cycle Royal Commission report. \(nla.gov.au\)](https://www.nla.gov.au) p.xv, May 2016



## 4. LEGISLATION SUPPORTING A POTENTIAL DOMESTIC NUCLEAR INDUSTRY

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### Overview

The MCA notes there are numerous existing Acts to support siting, design, construction, operation and decommissioning of a nuclear power plant. Those Acts (two of which are recommended for amendment through this Bill) are discussed below.

#### **Nuclear Non-Proliferation (Safeguards) Act 1987** <sup>19</sup>

Australian Safeguards and Non-proliferation Office (ASNO) – **Department of Foreign Affairs and Trade (DFAT)**

The principal object of this Act is to give effect to certain obligations that Australia has as a party to the Non-Proliferation Treaty, and the Nuclear Terrorism Convention and other international agreements.

Given the limited scope of Australia's current nuclear technologies, this Act is largely used to manage the export of uranium and other radioactive materials to countries that have signed individual safeguards agreements. However, the Act is broader in its scope and also allows the Minister to permit nuclear facilities to be established. Paragraph 28A(1)(a) describes the relevant minister's capacity to approve:

- a) a nuclear facility
- b) a facility for the carrying out of nuclear activities or
- c) a facility for the use of associated equipment.

This includes, but is not limited to, a nuclear power plant, a uranium enrichment facility, or a nuclear spent-fuel reprocessing facility. The Act also permits the disposal of nuclear materials, however subsequent work would likely be undertaken by the Australian Radioactive Waste Agency under a separate minister.

#### **The Australian Radiation Protection and Nuclear Safety Act 1988** <sup>20</sup>

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

The object of this Act is to protect the health and safety of people, and to protect the environment, from the harmful effects of radiation.

The MCA notes the ARPANSA Act has proven capable of managing many aspects of the nuclear fuel cycle. One of the more complex operations managed by the Act was the repatriation of nuclear fuel rods to ANSTO following reprocessing in France and the United Kingdom. These shipments occurred in December 2015 and March 2021 without incident, and another canister is due to return to Australia in the mid-2030s.

The reprocessed materials are stored in stainless steel canisters placed in a specially-constructed warehouse on ANSTO's Lucas Heights campus, and will be part of future disposal pathway to be developed by the Australian Radioactive Waste Agency (ARWA).

ARPANSA provides licensing for the storage of radioactive waste at Lucas Heights, and will also be responsible for licensing the National Radioactive Waste Management Facility (to be constructed under ARWA's enabling legislation).

#### **The Environment Protection and Biodiversity Conservation Act 1999** <sup>21</sup>

Department of Climate Change, Energy, the Environment and Water (DCCEEW)

The objects of this Act are:

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<sup>19</sup> Australian Government, [Nuclear Non-Proliferation \(Safeguards\) Act 1987](#), compilation 20 April 2012

<sup>20</sup> Australian Government, [Australian Radiation Protection and Nuclear Safety Act 1988](#), compilation 21 October 2016

<sup>21</sup> Australian Government, [Environment Protection and Biodiversity Conservation Act 1999](#), compilation 1 July 2016

- a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and
- b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and
- c) to promote the conservation of biodiversity; and
  - (ca) to provide for the protection and conservation of heritage; and
- d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and
- e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and
- f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.

The objects of this act do not directly prevent establishment of a nuclear energy industry in Australia. Section 37J is where the legislation limits this activity:

The Minister must not make a declaration relating to an action consisting of, or involving the construction or operation of, any of the following nuclear installations:

- a) a nuclear fuel fabrication plant
- b) a nuclear power plant
- c) an enrichment plant or
- d) a reprocessing facility.

This section is subject to the proposed amendments. In its current state, Section 37J also overrules ASNO's Minister approving similar facilities under the *Nuclear Non-Proliferation (Safeguards) Act*.

For more than six decades Australian industry and governments have repeatedly proved to be world-leaders for managing elements of the nuclear fuel cycle.

Whether mining for uranium surrounded by a UNESCO World Heritage national park, operating a research reactor in the suburbs of Australia's largest city, or transporting processed nuclear fuel rods through our second-busiest port,<sup>22</sup> the private and public sectors have collaborated to deliver exceptional environmental outcomes.

A domestic nuclear energy industry could take more than a ten years to establish, but will do so by utilising Australia's demonstrated ability to identify and mitigate environmental and radiological risks. Nuclear energy generation is one of the world's most-regulated industries, so it is reasonable for Australia's internationally-recognised reputation for nuclear safety to be expanded to this sector.

This reputation is founded, to a significant degree, on the history of uranium mining in Australia. However, despite more than seven decades supplying uranium to international customers in a safe and environmentally responsible manner, the commodity is still singled out under the EPBC Act.

### **National Radioactive Waste Management Act 2012** <sup>23</sup>

Australian Radioactive Waste Agency (ARWA)

The main objective of this Act is to ensure that controlled material is safely and securely managed by selecting a site for a radioactive waste management facility on land in Australia; and the establishment and operation of such a facility on that site.

Enriched uranium is one of the most energy-dense sources of electricity. A golf-ball-sized amount of nuclear material can supply enough energy for the average lifetime. As a result of this density, the volume of material that requires management is relatively small compared to traditional fuels.

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<sup>22</sup> IContainers, [Australia's Top 10 Major Ports, viewed 15 December 2022](#)

<sup>23</sup> Australian Government, [National Radioactive Waste Management Act 2012](#), compilation 30 June 2021

This spent fuel from nuclear energy generation may not even necessarily be considered waste – it can be safely stored for reuse in fast-neutron reactors. This technology, although long-established, supports emerging ‘Generation IV’ reactors that offer the prospect of vastly more efficient use of uranium resources and the ability to burn actinides which are otherwise the long-lived component of high-level nuclear waste.

However, it is important to note that Australia has successfully managed its existing radioactive waste and spent fuel from ANSTO’s nuclear research reactors for more than six decades. Low-level waste (LLW) and intermediate-level waste (ILW) is stored temporarily, though very safely, at ANSTO’s Lucas Heights. This is a temporary measure ahead of the establishment of the National Radioactive Waste Management Facility (NRWMF) for ILW, and a separate facility for the LLW.

The NRWMF will be designed, constructed and managed by ARWA as a dedicated and specialised agency. Since establishment in 2020, Australia has had a fit-for-purpose agency that, along with reformed ARPANS and EPBC acts, would oversee much of the legislation required to manage the nuclear fuel cycle.

The MCA recognises the expertise within this agency, and its capacity to expand operations through collaboration with international partners to manage spent fuel and by-products of nuclear energy generation.

## 5. REMOVING URANIUM MINING FROM THE EPBC ACT NUCLEAR TRIGGER

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Uranium mining is defined as a nuclear action, which is a matter of national environmental significance, and requires approval from the Commonwealth Environment Minister if it is considered likely to have a significant impact on the environment.

Australia holds one-third of the world's uranium reserves, but as a producer in 2021 only supplied just 6.7 per cent of global uranium demand. And Australia's untapped uranium resource opportunity is immense – about 1.7 million tonnes, with extensive reserves in the Northern Territory, Western Australia, Queensland and South Australia.

To put this in context, in 2021/22 Australia exported 4,933 tonnes of uranium. This is the equivalent of enough uranium to provide 67 per cent of Australia's national electricity market with zero carbon emission nuclear power.

The special treatment of uranium mining in the EPBC Act is unwarranted. Environmental impacts from uranium mining are generally the same as those for mining other commodities. There are only two risks from uranium mining that distinguish it from other commodities: nuclear proliferation and radiation. The former is dealt with through international agreement and legislation such as *Nuclear Non-Proliferation (Safeguards) Act 1987*. The latter is not restricted to uranium mining and is governed by guidelines from the national regulator (ARPANSA) implemented by state governments.

Accordingly, there is a strong case for uranium mining to be removed from the nuclear action trigger. The Commonwealth's resources could be better directed to working with state/territory governments through ARPANSA to ensure assessment of radiological aspects of uranium mining continues to reflect world best practice and uniform approaches are applied across Australia. Important components of such an approach include:

- Adherence with the ARPANSA National Standards for radiation protection in mining and minerals processing
- A radiological risk assessment of waste disposal facilities (such as tailings dams)

If the Australian Government wishes to retain uranium mining and milling as a nuclear action, it should, at the very least, make the following amendments to the EPBC Act and Regulations:

- Change the nuclear action trigger so it only applies if the radiological aspects of a proposed action are likely to have a significant impact on the environment.
- Limit the EPBC Act assessment of uranium to the radiological aspects of the proposal, and not a whole of environment assessment.

Further justification and evidence for these amendments can be found in the attached MCA policy paper *Mining and the EPBC Act Nuclear Action Trigger*.<sup>24</sup>

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<sup>24</sup> L Wilkinson, [Mining and the EPBC Act Nuclear Action Trigger](#), Minerals Council of Australia, October 2018